Attachment 5

Detailed Methodology for Project Performance Evaluation

Detailed Methodology for Project Performance Evaluation
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Introduction

This report includes a detailed discussion of the methodology used to rate projects in the Transportation 2030 project performance evaluation. The evaluation included two main elements: (1) needs assessment in which performance measures were used to assess the magnitude of future needs addressed by transportation projects; and (2) a corridor benefits assessment in which the impacts of groups of projects on corridor travel was assessed. The report presents the methodology and assumptions employed for each of the performance measures adopted in MTC Resolution No. 2654.

Part 1: Needs Assessment

Overview

In this part of the evaluation, MTC evaluated projects using the performance measures that asses future needs relative to the adopted corridor objectives. As MTC staff began the analysis, it quickly became apparent that even after screening out projects costing less than $5 million, the number of projects as well as their range in size and scope still posed a considerable challenge. As a result, MTC staff divided the projects into two groups based the ability to conduct a detailed assessment and the significance of the resulting information in the context of overall regional investment decisions. Projects likely to have regional impacts and those tied strongly to MTC policy interests were selected for a detailed needs assessment which measured the extent of future needs associated with the corridor objectives. The remaining projects were assessed on a yes/no basis which considered whether or not projects addressed the corridor objectives but did not attempt to measure the associated needs. These projects tended to be either mainly local (e.g., improvements to smaller, local roadways) or programmatic (e.g., citywide pedestrian improvements), making them more difficult to assess using the regional travel model and, in the case of more localized projects, less significant from the standpoint of regional transportation investments.

Approximately half the projects were selected for the detailed needs assessment. These projects included major capacity expansions, significant operational improvements, projects that close gaps in regional transportation networks, and projects with significant impacts for environmental justice or smart growth. Projects received high to low ratings based on the results for the performance measures associated with each corridor objective the project addressed, in essence the severity of the future needs the project was intended to address. A project rated on a yes/no basis was assigned a “yes” for each objective addressed.

The following pages describe the criteria used to determine whether projects addressed specific objectives and how they rated based on performance measures for the needs assessment. MTC staff depended heavily on those who submitted the projects to determine which objectives the projects addressed. When submitting the projects for MTC’s consideration, sponsors were asked to identify the objectives addressed. If a sponsor did not check an objective as applicable, the project generally was assumed not to address it and was not evaluated for that objective. For the Connectivity and Access objectives, where there was confusion about the definitions used, MTC staff reviewed all projects to determine which objective was addressed. In a few other cases, MTC staff evaluated objectives that clearly applied even if they were not checked. Unfortunately, there was not time to comprehensively review all objectives for all projects.

For the sake of consistency, data for the measures were derived largely from MTC regional travel demand model forecasts for year 2025. Much of the forecast data, has been summarized in the report *Draft Demographic Trends and Transportation System Conditions in 2025*, available from the MTC/ABAG library. Because the evaluation framework was mainly intended to evaluate new projects (those not in the 2001 RTP), the forecasts used to assess needs assumed implementation of investments in the 2001 RTP. Unless noted, data from the regional travel demand model is based on year 2025 forecasts using ABAG Projections 2003 land uses (the latest adopted land use assumptions). For some measures, where future needs could not easily be forecast, needs were assessed relative to current conditions or qualitative factors.

The needs assessment results are probably most useful for comparing various projects with respect to a given objective. The rating scales for each objective are customized to reflect a reasonable range of possible values while also considering the range of projects that needed to be evaluated. In some cases, where only a small number of projects were determined to address a given objective, MTC staff developed a scale to respond to the selected projects. As a result, the rating scales for some objectives are based on five levels (High, Medium/High, Medium, Medium/Low, Low) while others are based on three or fewer levels ((High, Medium, Low) or (High, High/Medium, Medium)).

The table below summarizes the number of projects considered for each objective and indicates the number in each rating category.

		Number of Projects in Each Rating Category							
Objective	Total Reviewed	High	High/ Med	Med	Med/ Low	Low	Yes	Incom- plete	No Rating
Operations or Reliability*	303	62	19	40	3	3	120	1	185
New Capacity	230	38	22	47	3	4	92	1	226
Access or Connectivity*	341	41	22	26	11	11	169	1	152
Port/Airport Access	106	4	0	54	0	2	34	0	339
Community Vitality	215	0	24	4	0	0	59	1	345
Equity	115	17	0	15	0	5	42	5	349
Safety	253	8	10	3	8	2	121	4	277
Seismic Safety	44	8	0	11	0	0	11	0	403
Air Quality	213	27	0	79	0	2	62	0	263
Customer Service	5	0	0	0	0	0	5	0	428
Maintenance	72	1	0	0	0	0	17	0	415
Noise Reduction	48	7	0	1	0	0	6	0	419

* Projects were initially evaluated separately for the operations and reliability objectives and the connectivity and access objectives. Subsequently, these ratings for operations and reliability and for connectivity and access were combined. In each case, the higher of the two ratings was carried forward for the combined rating.

Needs Assessment Measures

1. Accommodate Growth in Person and Freight Travel through Operational Efficiency

Measures

(a) Roadways – Roadway crowding in 2025 as measured by AM peak period volume to capacity (V/C) ratio in the project area (from the regional model).
(b) Transit – AM peak period ridership, capacity and utilization in 2025 (from the regional model).

A project is considered to address operational efficiency if it includes elements that aim to smooth traffic flow or transit operations generally without adding significant capacity. Elements used to identify projects addressing roadway operations include: geometric improvements such as turning lanes, grade separations, auxiliary lanes, braided ramps, slow vehicle climbing lanes, TOS and ITS. Even though they often result in significant capacity expansion, HOV lanes and transit park and ride lots are considered to address operational efficiency because they facilitate increases in vehicle occupancy and the movement of more people with given capacity. Elements used to identify projects addressing transit operations include transit signal priority, bus stop location improvements and proof of payment to decrease dwell times, maintenance facilities to ensure maximum fleet is operational, and improvements to transit operations systems.

Note that projects were initially rated separately with respect to the operational efficiency and reliability objectives. Subsequently, the ratings for these two objectives were combined, and the higher of the two ratings was used.

Rating Scale:

	(a) Roadway Operations Projects* AM Peak Period V/C Ratio	(b) Transit Operations Projects Utilization (passengers/policy load**)
High	Greater than 0.99 for more than 50% of project area	Greater than 1.0
Medium	0.8 to 0.99 for more than 50% of project area	0.8 to 0.99
Low	Less than 0.8 for more than 50% of project area	Less than 0.8

* A summary of future V/C conditions is included in the report *Draft Demographic Trends and Transportation System Conditions in 2025 (2/2/04).* For smaller road projects, V/C ratio was measured on larger parallel roads in the corridor. As the balance approaches 50/50, a medium/high or medium/low rating is assigned. Because V/C forecasts are available for AM peak only, V/C ratios in the off-peak direction are assumed to be comparable to those in the peak direction. For projects in the 2001 RTP, V/C ratios in the 2001 RTP No Build alternative were used.

** Policy load is the maximum policy load for that operator. Ridership and capacity are measured by transit route or routes in a given corridor.

2. Improve System Reliability

Measures

(a) Roadways – Crowding in 2025 as measured by AM peak period volume to capacity (V/C) ratio in the project area (from the regional model)

(b) Transit – Recent on-time performance in conjunction with change from 2000 in operating conditions, as measured by change in bus speeds or change in number of trains per day (on-time performance from operator or from *2003 State of the System* report; bus speeds and number of trains per day from the regional model)

A project is considered to address reliability if it includes elements that aim directly to respond to incidents or reduce the chance of unforeseen delays. This is an admittedly narrow definition. It could certainly be argued that capacity expansion projects often improve reliability; however, this was not automatically considered as it would make the reliability measure repetitive of the capacity measure.

Still, there is a great deal of overlap between projects that address operational efficiency and projects that address reliability. Because recurring congestion is distinguished from non-recurring congestion, roadway widening, HOV lanes and geometric improvements are not considered to address reliability unless they explicitly include TOS elements or signal coordination. Elements used to determine whether a roadway project addresses reliability include: signal coordination, ramp metering and TOS, transit signal pre-emption and railroad grade separations. Elements used to determine whether a transit project addresses reliability include: transit signal preemption and other preferential treatments including those that speed boarding, grade separations, maintenance facilities, rail crossovers and train control systems that allow speed up incident response and recovery.

Note that projects were initially rated separately with respect to the operational efficiency and reliability objectives. Subsequently, the ratings for these two objectives were combined, and the higher of the two ratings was used.

Rating Scale:

	(a) Roadway Reliability Projects* AM Peak Period V/C Ratio	(b) Transit Reliability Projects On-time performance		Operating Conditions**
High	Greater than 0.99 for more than 50% of project area	Significantly worse than policy	Or	Expected to worsen (reduced speeds or increase in trains)
Medium	0.8 to 0.99 for more than 50% of project area	Slightly worse than policy	And	Conditions are not expected to worsen
Low	Less than 0.8 for more than 50% of project area	At or better than policy	And	Conditions are not expected to worsen

* A summary of future V/C conditions is included in the report *Draft Demographic Trends and Transportation System Conditions in 2025 (2/2/04).* For smaller road projects, V/C ratio was measured on larger parallel roads in the corridor. As the balance approaches 50/50, a medium/high or medium/low rating is assigned. Because V/C forecasts are available for AM peak only, V/C ratios in the off-peak direction are assumed to be comparable to those in the peak direction. For projects in the 2001 RTP, V/C ratios in the 2001 RTP No Build alternative were used.

** Bus speeds are typically measured on a route basis. Where projects are specific to transit operations on selected roadway segments (but not entire routes), change in arterial speeds was used in lieu of change in bus speeds.

3. Accommodate Growth in Person and Freight Travel through Strategic Capacity Expansion

Measures

(a) Overall corridor or roadway capacity – Roadway crowding in 2025 as measured by AM peak period volume to capacity (V/C) ratio in the project area (from the regional model).

(b) Transit capacity – AM peak period ridership, capacity and utilization in 2025 (from the regional model*).

* For ferry projects, ridership is based on forecasts for the WTA Program Environmental Impact Review, which does not reflect smart growth but which is a more refined ferry demand forecast.

A project is considered to address capacity expansion if it adds significant capacity in proportion to the existing transportation facility or service. Examples include: transit service increases or extensions, HOV lanes that are more than a short gap closure; freeway and local roadway widenings; new local roads and roadway extensions that act as reliever routes in a congested corridor; major interchange improvements that add ramp capacity and new movements; and new capacity for cyclists and pedestrians. Projects that expand transit capacity or develop reliever routes in a congested corridor were evaluated based on the V/C ratio of the main freeway or roadway in the corridor. If the transit service assumed in 2025 is projected to be crowded, then the measure of transit crowding was also applied.

Rating Scale:

	(a) Projects Addressing Corridor Capacity * AM Peak Period V/C Ratio	(b) Projects Addressing Transit Capacity Utilization (passengers/policy load**)
High	Greater than 0.99 for more than 50% of project area	Greater than 1.0
Medium	0.8 to 0.99 for more than 50% of project area	0.8 to 0.99
Low	Less than 0.8 for more than 50% of project area	Less than 0.8

* A summary of future V/C conditions is included in the report *Draft Demographic Trends and Transportation System Conditions in 2025 (2/2/04).* For smaller road projects, V/C ratio was measured on larger parallel roads in the corridor. As the balance approaches 50/50, a medium/high or medium/low rating is assigned. Because V/C forecasts are available for AM peak only, V/C ratios in the off-peak direction are assumed to be comparable to those in the peak direction. For projects in the 2001 RTP, V/C ratios in the 2001 RTP No Build alternative were used.

** Policy load is the maximum policy load for that operator. Ridership and capacity are measured by transit route or routes in a given corridor.

4. Improve System Connectivity

Measures

(a) Gap closures – Qualitative assessment
(b) Roadway connectivity – Level of connecting activity in 2025 measured as daily vehicle volumes on the interchange ramps (from the regional model)
(c) Transit connectivity – Level of connecting activity in 2025 measured as transit vehicles per day at transit hubs (from the regional model)

MTC differentiated between projects addressing connectivity and projects addressing access based on the criteria described below and in the section on the connectivity objective. A project is considered to address connectivity if any of the following are true:

- Closes a gap, for example in HOV lanes, transit services, local roads, bicycle or pedestrian facilities. To qualify as a gap closure there must be an existing or programmed segment of the system on the either end. A project that extends the existing terminus of an HOV lane, for example, is not considered a gap closure.
- Improves to freeway-to-freeway or state highway-to-state highway interchanges. (Local interchange improvements are considered to address "access".)
- Improves transit connections at transit hubs, e.g., bus-bus, rail-rail, bus-rail, bus-ferry connections. (Pedestrian, bicycle and auto access improvements to transit hubs are considered to address "access".)

Projects that improve a facility connecting two locations were generally considered under capacity expansion or operations but not connectivity.

Projects were initially rated separately for the access and connectivity objectives. Subsequently, the ratings for these two objectives were combined, and the higher of the two ratings was used.

Rating Scale:

	(a) Gap Closure (Qualitative Evaluation)
High	In adopted regional system plan, such as the Regional HOV plan or Regional Bicycle Plan. Alternatively, project connects major regional facilities such as freeways (or state highways in rural areas) or regional trunkline transit routes.
Medium	Closes gap gap in a reliever route system or access to major regional facilities or trunkline transit. Includes projects in countywide bike plans.
Low	Offers primarily local benefits. For bicycle projects, is not in a countywide bike plan.

	(b) Roadway Connectivity (Daily Vehicles on Interchange)*	(c) Transit Connectivity (Daily Transit Vehicles at Terminal)**
High	200,000 or greater	2,500 or greater
Medium/High	150,000 to 199,900	1,000 to 2,490
Medium	100,000 to 149,900	500 to 990
Medium/Low	70,000 to 99,900	250 to 490
Low	Up to 69,900	Up to 250

* A summary of future volumes on major freeway-to-freewawy interchanges is included in the report *Draft Demographic Trends and Transportation System Conditions in 2025 (2/2/04).* This scale based on review of number of interchanges throughout the region, using natural break points to divide the interchanges into five groups of roughly equal size.

** One train or one bus is considered one vehicle. This scale based on review of transit terminals throughout the region, using natural break points to divide the terminals into five groups of roughly equal size.

5. Improve Access to the Regional Transportation System

Measures

(a) Access for passengers to the roadway system – Need for improved access, measured as growth in population and jobs from 2000 to 2025 in the areas surrounding the improvement (from the regional model)

(b) Access for passengers to transit – Need for improved access in 2025, measured as the number of daily persons entering or exiting a transit hub (from the regional model)

MTC differentiated between projects addressing connectivity and projects addressing access based on the criteria described below and in the section on the connectivity objective. A project is considered to address passenger access if any of the following are true:

- Improves a local interchange or a local road that provides direct access to a freeway or expressways. Projects improving freeway-to-freeway interchanges are considered to address connectivity rather than access.
- Addresses pedestrian, bicycle or auto access to transit hubs. This includes bicycle and pedestrian projects within one mile of transit stations; transit parking at terminals and park and ride lots; roadway improvements that facilitate bus and auto access to transit hubs; and projects that provide transit feeder service to major hubs. Station capacity projects that increase the number of passengers that can move through a station are considered to address access because the allow more people to get on or to the vehicles. Projects that expand trunkline transit service are not considered to address access.
- Extends a transit system or service to an area not currently served or adds infill stations to existing rail systems. These projects were evaluated using the criteria listed under "roadway access" below, as the "transit access" criteria would have been difficult to apply.

Projects were initially rated separately for the access and connectivity objectives. Subsequently, the ratings for these two objectives were combined, and the higher of the two ratings was used.

Rating Scale:

	(a) Roadway Access*	(b) Transit Access**
High	Population growth in Tier 1 (>8,000) or employment growth in Tier 1 (> 10,000)	More than 3,000 daily entries and exits
High/ Medium	Population growth in Tier 2 (4,000 - 8,000) or employment growth in Tier 2 (5,000 - 10,000)	
Medium	Population growth in Tier 3 (2,500 - 4,000) or employment growth in Tier 3 (3,000 - 5,000)	Between 1,300 and 3,000 daily entries and exits
Medium/ Low	Population growth in Tier 4 (1,000 - 2,500) or employment growth in Tier 4 (1,500 - 3,000)	
Low	Population growth in Tier 5 (< 1,000) or employment growth in Tier 5 (< 1,500);	Fewer than 1,300 daily entries and exits;

* A summary of projected growth in population and jobs is included in the report *Draft Demographic Trends and Transportation System Conditions in 2025 (2/2/04).* To determine the rating scale for roadway access, natural breaks were sought in growth in population and employment for each travel analysis zone. The rating scale is pinned to the resulting tiers so that the project is rates based on the higher of the two. For example, if the project rates in the highest tier for employment and the middle tier for population, it rates high.

** The rating scale for transit was developed by ranking all rail stations for BART, Caltrain, Amtrak and ACE by total entries/exits. Of all stations with up to 9,000 daily entries/exits, natural breaks at approximately the top third (3,000 entries/exits) and bottom third (1,300 entries/exits) were used to determine the thresholds between high and medium and medium and low. Note that the majority of BART stations are forecast to have more than 9,000 daily entries/exits (up to 65,000 at Powell and 164,000 at Embarcadero). The value of 9,000 entries/exits was chosen as the top for determining the 66^{th} and 30^{th} percentile break points because this it the approximate number of entries/exits at the highest ranked Caltrain station, excluding the Transbay Terminal.

6. Improve Access to Seaports and Airports

Measure

Access to ports and airports – Need for improved access measured as growth in airport passengers or air cargo from 2000 to 2025.

A project is considered to address port/airport access if any of the following are true:

- Improves a roadway providing direct access to a cargo sea port or commercial airport. (Access to passenger ferry terminals is addressed under passenger access.)
- Improves a transit service that provides direct access to a commercial airport.
- Directly improves truck travel or freight rail operations (e.g., freeway expansion or operational improvement) in a freight priority corridor from the Regional Goods Movement Study (I-580 east of Oakland; I-80; I-880; or US 101 in San Francisco, San Mateo, or Santa Clara).

Rating Scale:

	Airport Access	Seaport Access
High	Projects serving SFO passengers or SFO or Oakland air cargo	Projects directly serving Port of Oakland
Medium	Projects serving Oakland or San Jose air passengers Projects that directly improve truck travel in freight priority corridors	Projects serving mid-sized port operations (San Francisco, Richmond, Benicia). Projects that directly improve truck or freight rail travel in freight priority corridors
Low	Projects serving San Jose air cargo	Projects serving small ports (Redwood City)

7. Promote Community Vitality and Implement the Smart Growth Objectives

Measures

(a) Qualitative Assessment of degree to which project supports community vitality. Measured by the degree to which it improves a range of transportation choices by adding or improving transit, pedestrian, and/or bicycle facilities and improving the link between these facilities and activity nodes. (based on TLC program criteria)

(b) Degree to which project supports the regional agencies' Smart Growth polices and objectives. Measured by current and projected 2025 population and job density. (See Exhibit 1, next page.)

A project is considered to address the community vitality/smart growth objectives if it both of the following are true:

- Project supports access to community activities by alternative modes and the provision for access is a main purpose of the project (i.e., is not incidental to the main project purpose).
- Project is located in an area that is currently at least medium density or is projected to become this through a change in density.

Projects in the detailed evaluation were assigned 0 to 5 points for each measure based on the criteria in Exhibit 1. The points were then added and divided by two for a combined rating. This rating was translated into a Low to High score based on a 1 to 5 point scale as follows:

Rating Scale:

	Combined Score for (a) and (b) (rounded)	Projects Characterized By
High	5	Project considered high for at least one measure and high or medium/high for the other
Medium/ High	4	Project considered at least medium/high for one measure and no lower than medium for the other
Medium	3	Most projects in this range considered at least medium for one measure and no lower than medium/low for the other; a small number of projects considered high for Smart Growth Location and low for Community Vitality
Medium/ Low	2	Project considered medium/low for one measure and medium/low or low for the other
Low	1	Project considered low for both measures

Exhibit 1: Criteria for Points for Community Vitality & Smart Growth Measures

(a) Qualitative Assessment of Community Vitality

5 points – (High)	Directly provides significant new or greatly improved access to community activities by alternative modes. (e.g., new pedestrian/bike access to town or job centers; pedestrian/bike bridges and dedicated facilities; significantly improved pedestrian/bike access to transit; transit plaza and streetscape improvements oriented toward pedestrian/bike access, new sidewalks)
3 to 4 points – (Medium/High or Medium)	Contributes or supports access by alternative modes indirectly or as one part of a larger project (e.g., traffic calming; right-of-way for pedestrian/bike facilities; transit station improvements with substantial pedestrian/bike elements, replacement parking to support transit villages) and transit expansion projects that create distinct new nodes with TOD opportunities (e.g., new rail or ferry terminals)
1 to 2 points – (Medium/Low or Low)	Includes only minor improvements to alternative access or supports access by alternative modes as a minor portion of a larger project (e.g., roadway widenings, grade separations or interchanges with dedicated pedestrian/bike amenities; transit station access improvements with some pedestrian/bike amenities, new transit village oriented transit station)
0 points – (Low)	Projects that do not contribute to or support access to community activities by alternative modes or where the possible improvements are clearly incidental to the larger project. (e.g., highway bypass; roadway ramps; ramp metering; TOS; general transit operations; new transit vehicles; improved auto access to transit)

(b) Project Location*

5 points – (High)	Located in areas that are already high density (in population or jobs) or projected to have high intensity of growth (in population or jobs per acre) under the Smart Growth Vision (typically downtowns and transit stations/corridors).
4 points – (Medium/High)	Located in areas that are already medium/high density or projected to have medium/high intensity growth under the Smart Growth Vision.
3 points – (Medium)	Located in areas that are already medium density or projected to have medium intensity growth under the Smart Growth Vision.
2 points – (Medium/Low)	Located in areas that are already medium/low density or projected to have medium/low intensity growth under the Smart Growth Vision.
1 point – (Low)	Located in areas that are already low density and projected to have low intensity growth under the Smart Growth Vision.
0 points – (Low)	Located in areas that are low density and have no change or drop in land use intensity.

* An illustration of areas of significant change in land use intensity is included in the report *Draft Demographic Trends and Transportation System Conditions in 2025 (2/2/04).* A variety of statistical analysis procedures (including natural breaks and standard deviation from the mean) were used to determine thresholds for high, medium and low density areas and high, medium, and low intensity growth areas measured at the census block or TAZ level, depending on the land use data. Current population density based on Census 2000; current job density based on ABAG Land Use Database; future population and job density based on the Regional Agencies' Smart Growth Vision.

8. Promote Equity for System Users

Measure

Qualitative assessment of degree to which project would serve a community of concern

A project is considered to address equity, if at least one of the following is true:

- Project is in a community of concern, identified in the 2001 RTP (Note: the communities of concern for Transportation 2030 were defined in the summer of 2003 and were not available for the project performance evaluation.)
- Project involves a Lifeline transit route or addresses Lifeline transportation, as identified in the 2001 RTP.

Rating Scale*:

High	A major component of the project either provides direct benefits to a community of concern** or improves lifeline transportation services. Improvements considered to be of direct benefit generally correspond with the issues raised by communities during the MTC's Community Based Planning effort. These include: new or expanded transit service, bike and pedestrian safety improvements (including lighting), improvements and new connections providing access to jobs, shopping and other basic necessities. Where a project noted that it would mitigate noise, traffic or vehicle emissions, it was also considered to provide a direct benefit.
Medium	Project provides mainly indirect benefits or project provides some direct benefits but they are a smaller component of the project. The most common improvement considered to be an indirect benefit is travel time savings that would result from roadway improvements.
Low	Project may provide some benefits to a community of concern but the way in which the project serves the community of concern is not clearly described or is clearly incidental to the overall project purpose.

* Note that negative impacts were not considered in this evaluation. For example, in increases in traffic, noise, or vehicle emissions in a community of concern were not consider. However, if a project specifically identified that it would mitigate one or more of these factors, it was evaluated on these merits.

** An illustration of communities of concern from the 2001 RTP is included in the report *Draft Demographic Trends and Transportation System Conditions in 2025 (2/2/04).*

9. Improve Safety Through Collision Reduction and Improved Security

Measure

Recent incident history as measured by the average rate or number of collisions/security incidents over the past three years

In general, a project is considered to address the collision reduction/security objective if it includes features intended to improve safety/security directly or if data shows a higher than average collision rate for similar facility types. For projects on the state highway system, where recent collision data was available from the Caltrans TASAS system, a project is considered to address safety only if the fatal plus injury collision rate is higher than the average for that facility type. In the absence of data showing a higher than average collision rate, roadway widenings were not considered to address safety. Projects that enable but do not provide improved security monitoring at transit stations and park and ride lots were not considered to address security unless data was provided to indicate the need for improved security.

Among the elements considered to improve safety/security directly are:

- New traffic signal,
- Grade separation,
- ITS to regulate traffic flow and/or allow emergency vehicle pre-emption,
- Slow vehicle climbing lane
- Geometric improvement to reduce weaving, ease merging, correct sight distance or eliminate turning conflicts
- New median or new or widened shoulder
- Sidewalk or bicycle lane (especially if none existed before),
- Dedicated facility for non-motorized travelers
- Pedestrian crossing improvement
- Security cameras, transit station lighting

Rating Scale:

	Incident Rate Compared to Average for Similar Facility*
High	Greater than or equal to 1.5 times average
Medium/ High	Between 1.2 times and 1.49 times average
Medium	Between 1.1 times and 1.19 times average
Medium/ Low	Between 1.0 times and 1.09 times average
Low	Less than average

* For state highways, the fatal plus injury collision rate was used. For projects covering a segment of state highway, collision rates were reviewed for each end point, and the ranking is based on the location with the highest ratio of average to actual collision rates. For local roadways, data on recent collision rates and comparable averages was generally not provided. As a result, most local roadways were evaluated for safety on a yes/no basis, reflecting the types of improvements proposed.

10. Improve Seismic Safety

Measures

(a) Number of persons at risk in 2025, as measured by daily passengers or vehicles (from the regional model)
(b) Is project on Caltrans Lifeline System (state highways only)

A project is considered to address seismic safety, if at least one of the following is true:

- Project is mainly oriented toward a seismic or structural upgrade.
- Project results in a structural upgrade to a facility or structure on the Caltrans Lifeline Network or to a regional trunkline transit service. (Overcrossings of highways on the lifeline network are considered to be structures on the network.)
- Project would facilitate emergency response in the event of a major incident (e.g., ferries that can be deployed).

Rating Scale:

	(a) Daily Persons at Risk*		(b) On Lifeline Network**
High	More than 250,000	And	Yes
Medium/ High	150,000 to 250,000	And	Yes
Medium	150,000 to 250,000	And	No
	Fewer than 150,000	And	Yes
	Or project facilitates emergency response in event of an earthquake		

* Measured at selected locations on facility in question. For overcrossings, persons at risk reflects persons on the overcrossing as well as the facility underneath. The highest measurement was used for rating purposes. For roadways, forecasts of daily vehicles were multiplied by the average regional vehicle occupancy rate (1.3 persons per vehicle) to calculate the daily number of persons at risk.

** Caltrans Lifeline Network or on regional transit trunkline service.

11. Improve Air Quality

Measures

(a) Is project a state or federal transportation control measure (TCM)?
(b) Daily vehicle emissions in the project corridor in 2025*

* See results for corridor benefits analysis. This data ultimately was not factored into the needs assessment rating.

A project is considered to address air quality if it is a federal or state TCM in the 2001 Ozone Attainment Plan or the 2000 Clean Air Plan.

Rating Scale:

	(a) TCM Status
High	Project falls under a federal TCM that is not considered fully implemented.
Medium	Project falls under a state TCM or a federal TCM that is considered fully implemented.

12. Reduce Transportation-Related Noise

Measure

Measures taken to reduce noise or change in noise causing activity*

* The adopted measure was volume and speed in 2025. This measure would have been cumbersome to apply for the small number of projects determined to address noise reduction.

A project is considered to address noise if it directly reduces noise or includes provisions to reduce noise. For example, projects that eliminate grade crossings and (and the need for trains to sound their horns) and project that include soundwalls or landscaping to mitigate noise are considred projects that address noise reduction. Electrification of diesel trains is also considered to reduce noise.

Rating Scale:

High	Project reduce noise over a large area (electrification of a rail line, soundwalls over a distance of several miles)
Medium	Project reduces noise in a localized area (isolated grade crossings, soundwalls at a single point)

13. Maintain the System

Measures
(a) Amount of wear and tear on transit system, as measured by vehicle miles per vehicle plus passenger miles per vehicle for the most recent year available.*
(b) Amount of wear and tear on roadways, as measured by total and truck vehicle miles traveled in 2025.
* Note that the adopted criteria called for us to estimate wear and tear in 2025. This was a cumbersome calculation. As a result, the most recent data available from the National Transit Database (Fiscal Year 2002-2003) was used.

A project is considered to address maintenance if at least one of the following conditions is true:

- Primary project purpose is maintenance.
- Project has an explicit allowance for maintenance, (e.g. some bicycle and pedestrian programs specifically set aside money for maintenance)
- Information was provided to demonstrate that project replaces or improves an existing facility in sub-standard condition.

Projects that include routine system upgrades were not considered to address maintenance unless the application demonstrated that the existing facility/system was in substandard condition.

Rating Scale:

Just one project subjected to the detailed evaluation was determined to address maintenance, Golden Gate Bridge Rehabilitation Project. This project which is forecast to carry 298,000 daily VMT and 10,000 daily truck VMT in 2025 was rated high.

Part 2: Corridor Benefits Analysis

Overview

The corridor benefits analysis assessed the impacts of groups of new projects at the corridor level by looking at corridor travel with and without the improvements. The analysis used the travel corridors defined in the 2001 RTP (See Exhibit 2.) Three categories of corridor benefits were measured for each corridor in 2025 using MTC's regional travel demand model: changes in average travel time as an indicator of accessibility; changes in vehicle miles traveled and motor vehicle emissions; and overall user benefits (based on the value of travel time savings).

To assess the benefits of groups of projects, MTC staff grouped the new projects into three alternatives for comparison against the "base case". As with the needs assessment, the corridor benefits analysis was focused on assessing new projects so the base case was defined as the 2001 RTP program of investments. The three alternatives are:

Alternative 1: System Management & Local Access

This alternative consists of operational and system management projects (such as freeway traffic operations system (TOS), auxiliary lanes, ramp metering, arterial signal timing with transit pre-emption, and transit proof-of-payment systems for Muni and AC Transit.) The alternative also includes a number of local roadway access alternatives such as local interchange improvements and local roadway widenings.

Alternative 2: Capacity Expansion

This alternative includes, in addition to all the projects in Alternative 1, projects thought likely to be considered for future funding from existing revenue sources (i.e., projects thought to be candidates for the "financially constrained" portion of Transportation 2030). In fact, most of these projects cannot be funded unless new revenues are found; however, this was not apparent when MTC staff initiated the analysis.

Alternative 3: Further Expansion

This alternative includes, in addition to the projects in Alternatives 1 and 2, projects that were known to require new revenues. Many of the big ticket projects in new or renewed sales taxes expenditure plans proposed for the November 2004 ballot are in this alternative. In addition, since most transit operators face transit operating shortfalls over the Transportation 2030 period, this alternative includes most of the major transit service expansion projects.

The alternatives are cumulative so that Alternative 2 includes all projects in Alternative 1, and Alternative 3 includes all projects in Alternatives 1 and 2. This reflects the likelihood that system management investments would be pursued before or in concert with the major expansion and, further, that first tier capacity expansion investments would likely be pursued before those clearly requiring new revenues.

Here it is worth noting that Alternative 3, Further Expansion, was more a "grab bag" of projects that did not fit into the other alternatives than it was a coherent investment scenario. In fact, several projects in Alternative 3 essentially duplicate services offered by other projects in the alternative. It was ultimately necessary to exclude these duplicative projects in Alternative 3 from the cost benefit measure described below to get a meaningful measure.

A list of the projects modeled in each alternative is shown in Exhibit 3. By necessity, the three alternatives included only those projects that can be represented in the regional travel demand model (e.g., operational improvements, transit service changes and capacity expansion). Bicycle and pedestrian projects, maintenance and rehabilitation projects, and programmatic investments were not included in this part of the evaluation.

Corridor Benefit Measures

1. Average Travel Time

This measure is intended as an indicator of accessibility. With higher levels of accessibility, average travel time is expected to decrease. In this analysis, land use assumptions are held constant in the base case and alternatives; thus, accessibility is impacted only by changes in the transportation system that affect travel time.

Average travel time for each corridor is calculated by dividing the aggregate daily travel time for trips occurring in the corridor by the number of daily trips to yield the time (in minutes) per trip. Trips are determined to be within a corridor if the most likely path between the origin and destination falls within the corridor. Average travel time for each corridor is calculated for all trips together and by mode: carpool, drive alone, auto-non-work, transit and non-motorized.

2. Emissions and Vehicle Miles Traveled

The emissions estimates are sketch level estimates of tailpipe and other emissions (mainly those associated with engine starts) of the following pollutants:

- Reactive organic gasses (ROG), one of two ozone (smog) precursors
- Nitrogen oxide (NOx), the second ozone precursor
- Particulate matter (PM_{10} and $PM_{2.5}$), small particle that can enter the lungs and cause respiratory illness. $PM_{2.5}$ particles are smaller than PM_{10} particles.

The estimates are derived by applying emission factors for each pollutant to forecasted of vehicle miles traveled (VMT) and the number of trips in each corridor. While the estimates are not comparable to emissions calculations for air quality conformity analyses, they are reasonable sketch estimates.

Generalized emissions factors for each pollutant are derived from the California Air Resources Board EMFAC 2002 version 2.2 (April 23, 2003) and applied to the VMT and vehicle trips estimates for each corridor. Separate emissions factors based on travel speeds are used for autos and truck and for peak period travel (assumed to occur over six hours a day) and off-peak travel. The same set of generalized factors is used for all corridors.

Total emissions in each corridor is the sum of "tailpipe" emissions associated with running vehicles and other emissions such as those associated with engine starts. For tailpipe emissions, total peak period and daily VMT in selected travel speed cohorts are extracted from the travel demand model for freeways, state highways, and major arterials within each corridor. For simplicity, the share of truck and automobile VMT is assumed to be constant in the peak and off-peak periods and in all speed cohorts. The other emissions include those

associated with vehicle starts and evaporative ROG emissions, which occur after a vehicle has been turned off. Factors for these types of emissions are applied to the number of truck and automobile trips between the origins and destinations in each corridor.

3. Benefit Cost Analysis

The benefit-to-cost ratio compares annual user benefits in year 2025, composed of the value of travel time savings and savings in out-of-pocket costs, with the incremental public expenditure for each alternative. As such, it measures the cost-effectiveness of proposed investments. User benefits is a reasonable measure of the value of mobility benefits, though it may understate benefit where there are significant improvements to reliability, such as with freeway ramp metering. The measure does not reflect potential benefits of emission reductions or reduced collisions due to safety improvements. The methodology used for the Transportation 2030 project performance evaluation is consistent with the approach used in the Performance Measures analysis for the 2001 RTP, which is described in detail in *Performance Measures Report for the 2001 Regional Transportation Plan for the San Francisco Bay Area, Appendix B* (August 2001).

The benefit-to-cost ratio is reported at the regional level only due to the difficulty of assigning costs and projects consistently to corridors. Specifically, benefits are assigned to corridors based on origins and destinations while costs are assigned to corridors based on project location. The benefits for a particular project may show up in many corridors, but costs will generally show up in just one corridor.

User benefits are estimated for year 2025 based on the value of travel time savings and out-of-pocket cost savings (vehicle operating costs, transit fares, parking, and bridge tolls) extracted from regional travel demand model forecasts. The table below shows the valued of travel time used to monetize the forecasted travel time savings. The value of out-of-pocket cost savings is extracted directly from the regional travel model. (For more information see documentation on MTC's web site (http://www.mtc.ca.gov/datamart/forecast.htm).

Value of Time Assumptions (2004$)

Value of Time for Passenger Travel	Value of Time for Passengers Waiting for Transit	Value of Time for Trucks
$19.98/hour 75% of the average Bay Area Wage Rate ($26.11/hour), as reported by the Bureau of Labor Statistics in April 2003, adjusted to 2004$. This value represents the post-tax wage rate.	$43.99/hour Passenger value of time weighted by a factor of 2.2. This factor is based on the estimated values of in-vehicle and out-of-vehicle time in the regional travel demand model.	$80/hour Reflects driver wages and overhead

In the benefit-to-cost ratio, annual benefits are compared to the incremental public expenditure, measured as annualized capital costs and annual operations and maintenance costs associated with the improvements being evaluated. Where capital and annual operating and maintenance costs were provided as part of project submittals, these estimates were used. For a few projects, mainly those submitted by members of the public, sketch level capital cost estimates were developed based average unit costs for similar projects. While capital costs were provided for most projects, sponsors failed to provide annual operating and maintenance costs for a considerable number of projects. In such cases, sketch level annual operating and maintenance estimates were based on a percent of total capital cost. The factors used were based on the complete cost data available for similar projects.

To annualize capital costs, MTC staff assumed a 4% real discount rate and used the lifecycle assumptions shown below. Since the benefits of safety and reliability projects are not captured in the user benefits measure, the cost of these improvements is not included in the calculation of incremental public expenditure. In measuring the cost benefit ratio for Alternative 3, Further Expansion, it was necessary to exclude several projects offering duplicative service to generate a more meaningful measure.

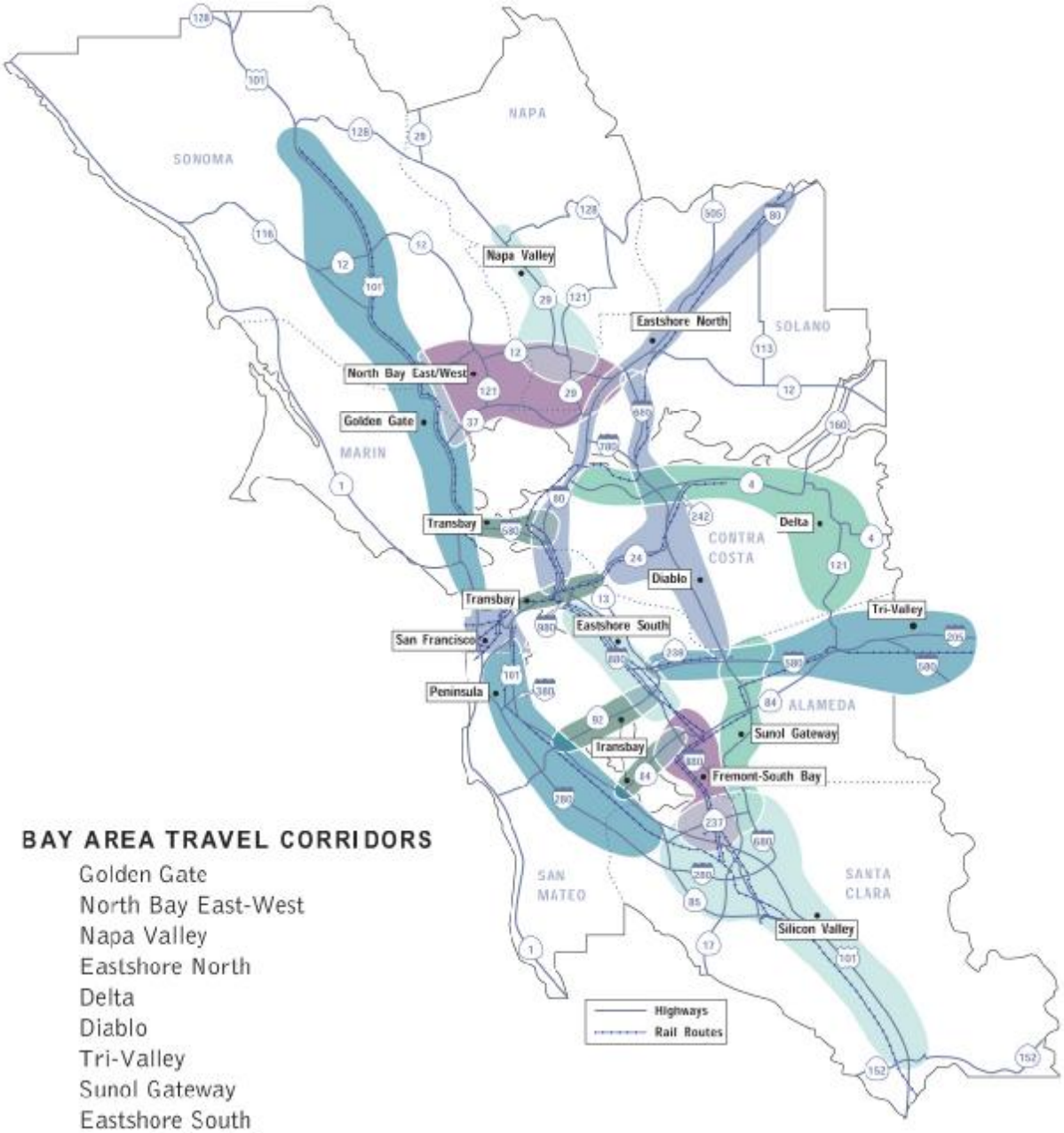
Assumptions for Annualizing Project Capital Costs

Real Discount Rate[1]	4%
Expected Lifecycle by Project Type[2]	
Roadway Expansion	20
Bus Expansion	12
Rail Expansion	30
Ferry Expansion	20
System Management (freeway ramp metering, traffic operations system, arterial signal timing, etc.)	20
New buildings/facilities (e.g., park and ride lots, transit centers)	20

[1] This appears to be a reasonable, if not conservative assumption. The real interest rate on long-term government bonds between 1960 and 1999 was 2.5%.

[2] For transit, the assumed lifecycle is based on FTA guidance. For roadway expansion, the assumed lifecycle is based on assumptions in Cal B/C model developed by Caltrans. For system management projects, the assumed lifecycle represents a middle point for various elements in the Caltrans Transportation System Management Inventory (December 2003).

Exhibit 2
Bay Area Travel Corridors



BAY AREA TRAVEL CORRIDORS

Golden Gate
North Bay East-West
Napa Valley
Eastshore North
Delta
Diablo
Tri-Valley
Sunol Gateway
Eastshore South
Fremont-South Bay
Silicon Valley
Peninsula
San Francisco
Transbay
Interregional Gateway

Exhibit 3
List of Projects Modeled in Each Alternative for the Corridor Benefits Analysis

Alternative 1 System Management & Local Access	Alternative 2 Capacity Expansion Alternative 1 investments plus:	Alternative 3 Selected Big Tent Projects Alternative 1 & 2 investments plus:
Golden Gate		
436 MRN-101 SB Auxiliary lane at Lincoln to Mission		513 SMART Commuter Rail (includes bike path)
437 MRN-101 NB Auxiliary lane at Nave Dr.		459 Southern Marin Streetcar
159 Marin County North Route 101 Ramp Meter, TOS, Fiber Optic Cable Project		483 Santa Rosa – San Francisco BRT*
160 Marin County South Route 101 and I-580 Ramp Meter, TOS, Fiber Optic Cable Project		458 Sir Francis Drake Blvd./Red Hill/2nd & 3rd St. Arterial HOV Demonstration Project with enhanced bus service
199 Sonoma County 101 Corridor TOS Project		
200 Sonoma County 101 Ramp Metering and fiber optic cable		
192 Airport Boulevard Widening		
207 Farmers Lane Extension - Bellevue Avenue to SR 12		
204 Fulton Road Improvements		
150 Hwy 101 Corridor from SFD Interchange to Tamalpais Interchange		
206 Hwy 12 Interchange at Fulton Road		
North Bay East-West		
329 Solano County SR-37 TOS and Fiber Optic Communication Project	300 SR 12 (east) corridor improvements	286 SR 37 Widening with environmental mitigation
Napa Valley Subarea		
211 Connect Devlin Road from Soscol Ferry to Green Island.	214 Widen SR 29 from SR 12 to Solano County line to six lanes	
212 Connect Flosden Road to SR 12	215 Widen SR 29 to 6 lanes from SR-221 to SR-12/Airport Blvd.	
Eastshore North		
446 AC Transit Proof of Payment on select routes	303 I-80 EB & WB HOV Lane - From Carquinez Bridge to SR 37	516 Capitol Corridor Regional Rail Service (West Contra Costa and Solano counties)
295 I-80 EB Auxiliary Lane from Magellan to Beck	324 Extend WB I-80 HOV from east of Carquinez Bridge to Maritime Academy On-Ramp	449 East Bay Streetcar Corridors linking employment centers in Oakland, Emeryville, Berkeley not close to BART*
307 I-80 EB Auxiliary lane from Tennessee to Redwood	356 I-80 Eastbound HOV lane from Willow Avenue to Crockett	451 Telegraph Avenue LRT: UC Berkeley to Jack London Sq*
308 I-80 WB Auxiliary Lane from Redwood to Tennessee		452 East Bay Light Rail: on San Pablo Ave and University Ave
309 I-80 WB Auxiliary Lane from Georgia to Benicia		445 Martinez-Benicia-San Francisco Ferry Service
310 I-80 EB Auxiliary lane from Benicia Road to Georgia Street		
315 I-80 EB and WB Auxiliary Lanes - SR 12 E to Suisun Valley Road		
316 I-80 EB Auxiliary Lane from Air Base Parkway to North Texas		

* Project duplicates another project in this alternative and was excluded from benefit-to-cost ratio for Alternative 3.

Alternative 1 System Management & Local Access	Alternative 2 Capacity Expansion Alternative 1 investments plus:	Alternative 3 Selected Big Tent Projects Alternative 1 & 2 investments plus:
318 I-80 EB Auxiliary Lane from Cherry Glen to Alamo		
322 EB I-80 Auxiliary Lane from Redwood to SR 37		
323 I-80 EB Auxiliary Lane from the SR 12 EB off-ramp to the Magellan EB off-ramp		
94 Alameda County I-80 Ramp Metering/Fiber Optic Communications Project		
325 Solano County I-80 TOS Project		
326 Solano County I-80 Ramp Meter Project and TOS fiber optic communications system		
378 Contra Costa County I-80 and I-580 TOS and Fiber Optic Cable Project		
370 North Richmond Truck Route Project: Extend Pittsburg Ave for truck access between I-580 and industrial area		
Delta		
376 Contra Costa County SR 4 Ramp Meter, TOS and Fiber Optic Cable Project	346 East County Express Bus Expansion	141 eBART (State Route 4 East Rail Transit Project)
363 Lone Tree Way - Union Pacific Railroad Undercrossing	396 State Route 4 Bypass - Phase II: Lone Tree Way to Balfour Rd upgrade to freeway includes interchanges	
369 SR4 South Parallel Arterial - Antioch: Widen and extend Buchanan and widen Tregallas		
373 Pittsburg Antioch Highway Widening to 4 lanes: Somersville Rd - Antioch	334 Buchanan Road Bypass	
393 SR 4 North Parallel Arterial Project, Pittsburg Portion	400 State Route 239 (Brentwood - Tracy Expressway)	
394 SR 4 Overcrossing at Range Rd.	399 State Route 4 Widening - Marsh Creek Road to San Joaquin County line	
408 West Leland Road Extension	406 Vasco Road Widening to 4 lanes: Brentwood to Alameda County line	
390 SR 4/Willow Pass Road Ramps - Concord		
392 SR 4 Interchange at Range Road	358 I-80/SR-4 Interchange Improvements	
Diablo		
344 Central County Transfer Terminal & Park & Ride Lot Program	351 I-680 NB HOV Gap Closure Between N. Main and SR242	304 Complete I-80/I-680/SR 12 Interchange Improvements (Phase 3)
353 I-680 SB HOV Gap Closure Between N. Main and Livorna (take a lane through I-680/SR 24 interchange and add aux lanes)	350 I-680/SR 4 Interchange Improvements (Phase 3 through 5)	
328 Solano County I-680 Ramp Metering and TOS Project		
375 Contra Costa County SR 24 and I-680 TOS and Fiber Optic Cable Project		
443 Solano County I-780 Ramp Metering, TOS and Fiber Optic Communication Project		
341 Widen Camino Tassajara to 4 lanes (Danville - Windemere Pkwy) and to 6 lanes (Windmere Pkwy to Alameda County line)		
352 I-680/Norris Canyon Rd HOV Direct Ramps in San Ramon		
388 SR 242/Clayton Road NB On-Ramp		
389 SR 242/Clayton Road SB Off-Ramp		
Sunol Gateway		
93 Alameda County I-680 Sunol Grade TOS Project	42 HOV Lanes on I-680 in both directions: SR 84 to Alcosta	
	43 Widen/Upgrade SR-84 to 4-lane expressway	

Alternative 1 System Management & Local Access	Alternative 2 Capacity Expansion Alternative 1 investments plus:	Alternative 3 Selected Big Tent Projects Alternative 1 & 2 investments plus:
Tri Valley		
90 Alameda County West I-580 Ramp Metering and TOS: I-238 - Contra Costa County Line	37 WB I-238 HOV lane to SB I-880: HOV bypass connector	
69 Jack London Boulevard Extension	68 I-580/Route 84 (Isabel Avenue) Interchange Phase 2	
29 I-580 Interchange Improvements in Castro Valley		
Eastshore South		
95 Alameda County I-880 Fiber Optic Cable and CCTV and SR24 TOS Project	1 I-880 HOV lanes: NB lane from Hacienda Blvd overcrossing to 98th & SB lane from 98th to Marina	447 BRT/Enhanced Bus: Hayward BART to Cal St Hayward
63 Route 238 Corridor Improvement Project: Widening Foothill/Mission between I-580 and Harder Rd.	67 Phase 1B I-880/SR262/Warren Ave Interchange and I-880 HOV Widening	448 AC Transit BRT and Enhanced Bus: Shattuck/Alameda BRT; MacArthur Boulevard BRT (Bayfair - Emeryville); MacArthur Ave to Oakland Airport; College/University Aves; Sacramento/Market Streets; Mission/Outer East 14th
240 E. Lewelling Roadway Improvements Project: widen to 4 lanes from Hesperian Blvd to Meekland Ave		
80 Oakland Citywide ITS - Phase 1		
85 Oakland Airport Area ITS Project		
3 I-880/Industrial Parkway Northbound off ramp		
60 Clawiter-Whitesell Interchange		
66 I-880/Winton Avenue interchange improvements		
76 I-880 Fifth Avenue Ramp Reconfiguration Project		
29 I-580 Interchange Improvements in Castro Valley		
Fremont-South Bay		
	62 Irvington BART Station	470 Personal Rapid Transit: 3 mile Feeder to Milpitas LRT Station**
	15 I - 680/I - 880 Cross Connector Project	471 Personal Rapid Transit: 10 mile route connection to Montague BART station [proposed] and extensive circulation within Milpitas**
Silicon Valley		
124 SCI-680 NB/SB Auxiliary lane from McKee to Berryesa	134 Widen Southbound US 101 from Story to Yerba Buena	
127 SCI-85 NB/SB Auxiliary lane from Saratoga/Sunnyvale Stevens Creek.	138 US-101 Widening from Monterey Highway to Route 25	
128 SCI-85 NB/SB Auxiliary lane from Saratoga Ave.to Saratoga/Sunnyvale.	140 US-101 Widening from Cochrane Road to Monterey Highway (includes 2 new interchanges)	
130 SCI-85 NB/SB Auxiliary lane from N. of Winchester to Saratoga Ave.	172 Widen I-880 to 8 lanes by adding 2 HOV lanes: SR 237 - Old Bayshore	
158 SR-85 Improvements - Southern Segment: Homestead Road - El Camino Real (auxiliary lanes and overcrossing widening)	175 Almaden Expressway Improvements: widen to 8 lanes	
161 SR-85 Improvements - Northern Segment (improve interchanges, widen, and add ramp metering): El Camino - SR 237	179 Central Expressway Improvements between Lawrence Expressway and San Tomas Expressway: Widen from 4 to 6 lanes	
185 Oakland Road Widening	186 San Tomas Expressway Improvements Between SR82 and Williams Road: widen to 8 lanes	

* Project duplicates another project in this alternative and was excluded from benefit-to-cost ratio for Alternative 3.
** Not included in the benefit-to-cost ratio for Alternative 3 since project can be only loosely represented in the travel demand model.

Alternative 1 System Management & Local Access	Alternative 2 Capacity Expansion Alternative 1 investments plus:	Alternative 3 Selected Big Tent Projects Alternative 1 & 2 investments plus:
176 Berryessa Road Widening to 6 lanes from I-680 to Commercial Street.		
145 Westbound SR 237 to Northbound US 101 Improvements (includes auxiliary lanes)		
156 Northbound SR 85 to Eastbound SR 237 Improvements (includes auxiliary lane and interchange)		
162 SR 237 Westbound to SR 85 Southbound Improvements		
165 Southbound US 101 to Eastbound SR 237 Improvements (auxiliary land and interchange improvements)		
17 Left-turn Flyover from Eastbound SR 237 Mathilda Avenue Off-ramp		
18 Mathilda Avenue Interchange Improvements (Northbound US 101 and Westbound SR 237)		
147 US 101 Interchange at Zanker Road/Skyport Drive/North Fourth Street		
148 US 101 Interchange at Mabury Road/Taylor Street		
153 Mathilda /SR-237 Corridor Improvements (Mary Ave. Extension)		
Peninsula		
282 US-101 capacity improvements near SR-92	226 Bayshore Intermodal Facility)	535 Caltrain Baby Bullet Phase 2
230 I-280 Auxiliary Lanes: I-380 - Hickey Blvd.	283 State Route 92, from Route 101 to 280: widen to 6 lanes	
281 I-280 Auxilliary Lanes at Woodside Rd. (SR84)	277 Route 1 Widening: Miramontes Point Rd - Capistrano Rd	
262 San Mateo County North 101/92 Ramp Metering/TOS/Fiber Communications Project	233 Northbound I-280, Hwy 1 Interchange: NB 280 to SB 1	
264 San Mateo County North I-280/380 Ramp Metering/TOS/Fiber Communications Project	238 Pacifica Highway 1 Calera Parkway Project	
265 San Mateo County South I-280 and SR 92 Ramp Metering/TOS/Fiber Communications Project	271 Skyline Blvd. (SR 35) Widening from I-280 to Sneath Lane	
228 Lagoon Way extension		
22 Palo Alto Smart Residential Arterials		
275 Crestview Drive Connection to Route 280		
229 Sierra Point Parkway/U.S. 101 Interchange Replacement		
273 Route 101 Candlestick Interchange Reconstruction		
227 Geneva Avenue Extension: Bayshore Blvd. to US 101/Harney ramps		
San Francisco Countywide		
460 MUNI Proof of Payment on Market St	413 Geary Corridor Bus Rapid Transit	414 Geary LRT
	428 Van Ness Bus Rapid Transit	463 MUNI F Line spur to N-Judah Spur and Golden Gate Park connection
	415 Historic Streetcar Service	425 19th Avenue Bus Rapid Transit
		427 Potrero Bus Rapid Transit
		247 Bayview Transportation Improvements Project (alt access route between Hunters Point Shipyard and US 101)

Alternative 1 System Management & Local Access	Alternative 2 Capacity Expansion Alternative 1 investments plus:	Alternative 3 Selected Big Tent Projects Alternative 1 & 2 investments plus:
Transbay		
	410 Dumbarton Rail Corridor	482 Enhanced AC Transbay service
	234 Dumbarton Bridge Highway 101 Access	115 Antioch/Pittsburg to Martinez to San Francisco Ferry Service
	35 Extend HOV lanes on I-580: SR 24/I-580 interchange - I-80/I-580 interchange	119 Hercules to San Francisco Ferry Service
	116 Berkeley/Albany to San Francisco Ferry Service	120 Redwood City to San Francisco to Alameda Ferry Service
	125 South San Francisco to San Francisco to Alameda Ferry Service	122 Richmond to San Francisco Ferry Service
	440 Alameda/Oakland to San Francisco Ferry Service	126 Treasure Island to San Francisco Ferry Service
		163 Construct New WB I-580 to SB US 101 Freeway Connector
		444 HOV connector from WB I-580 to NB US 101